

Fig. 1

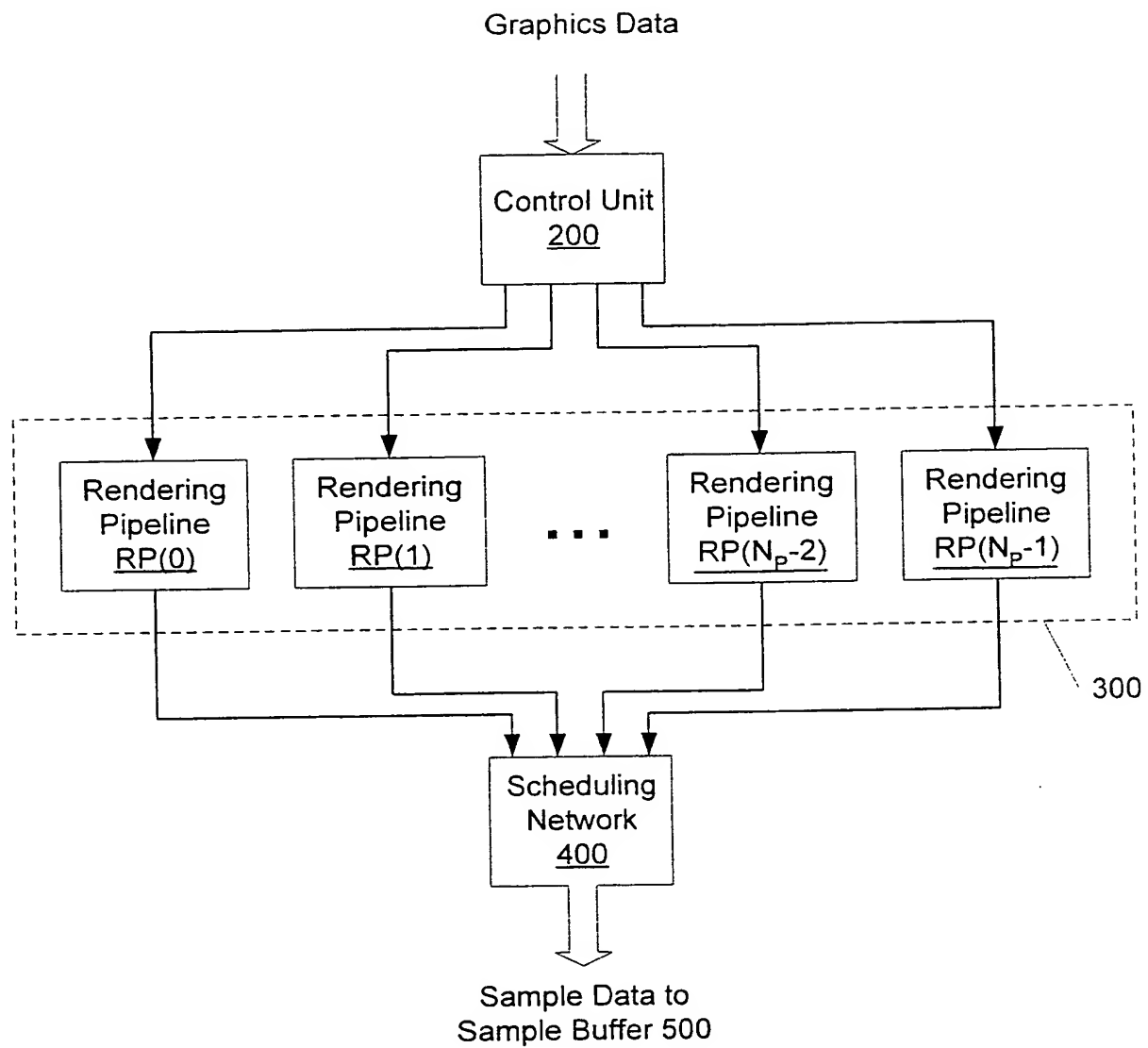


Fig. 2

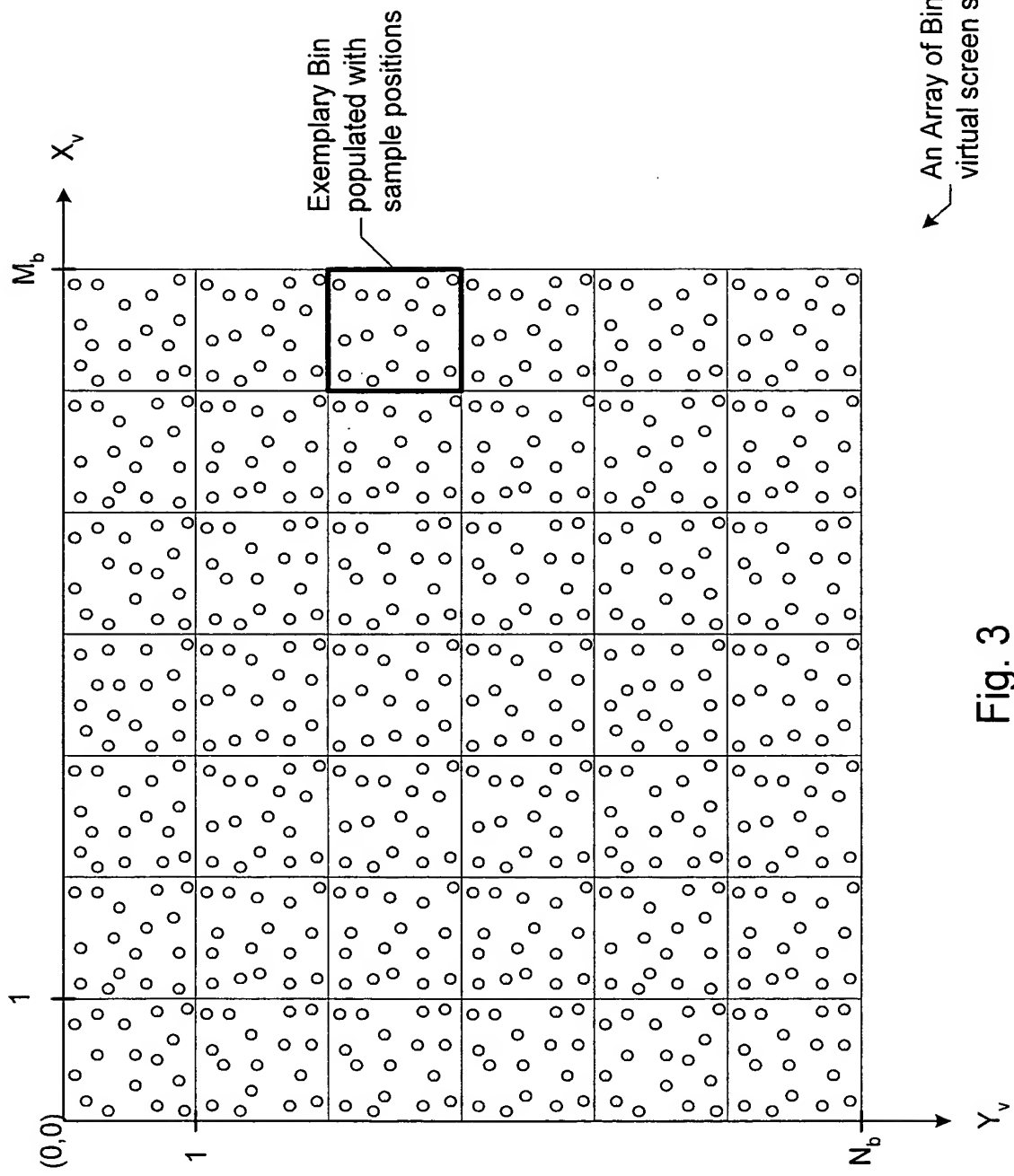


Fig. 3

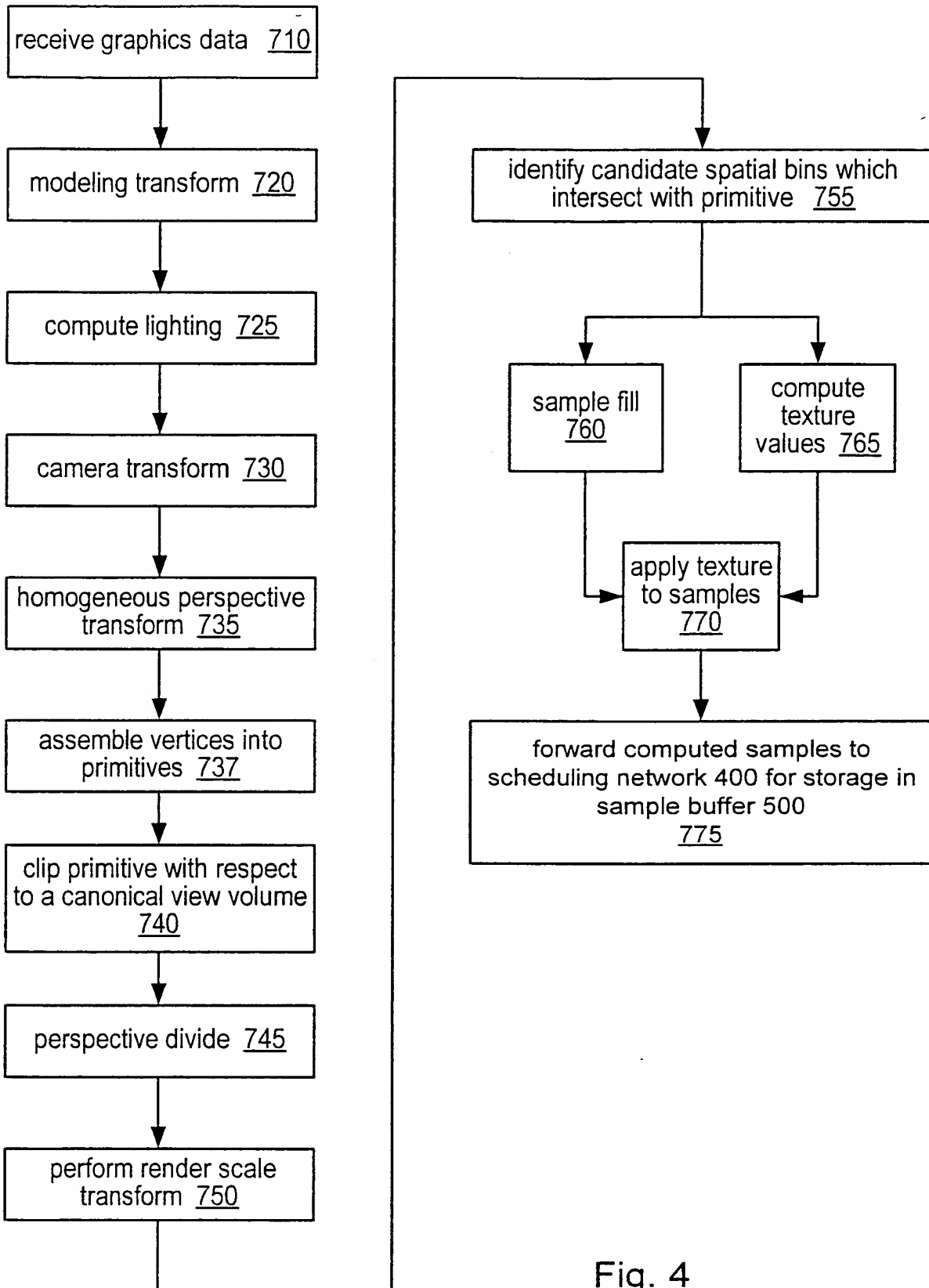


Fig. 4

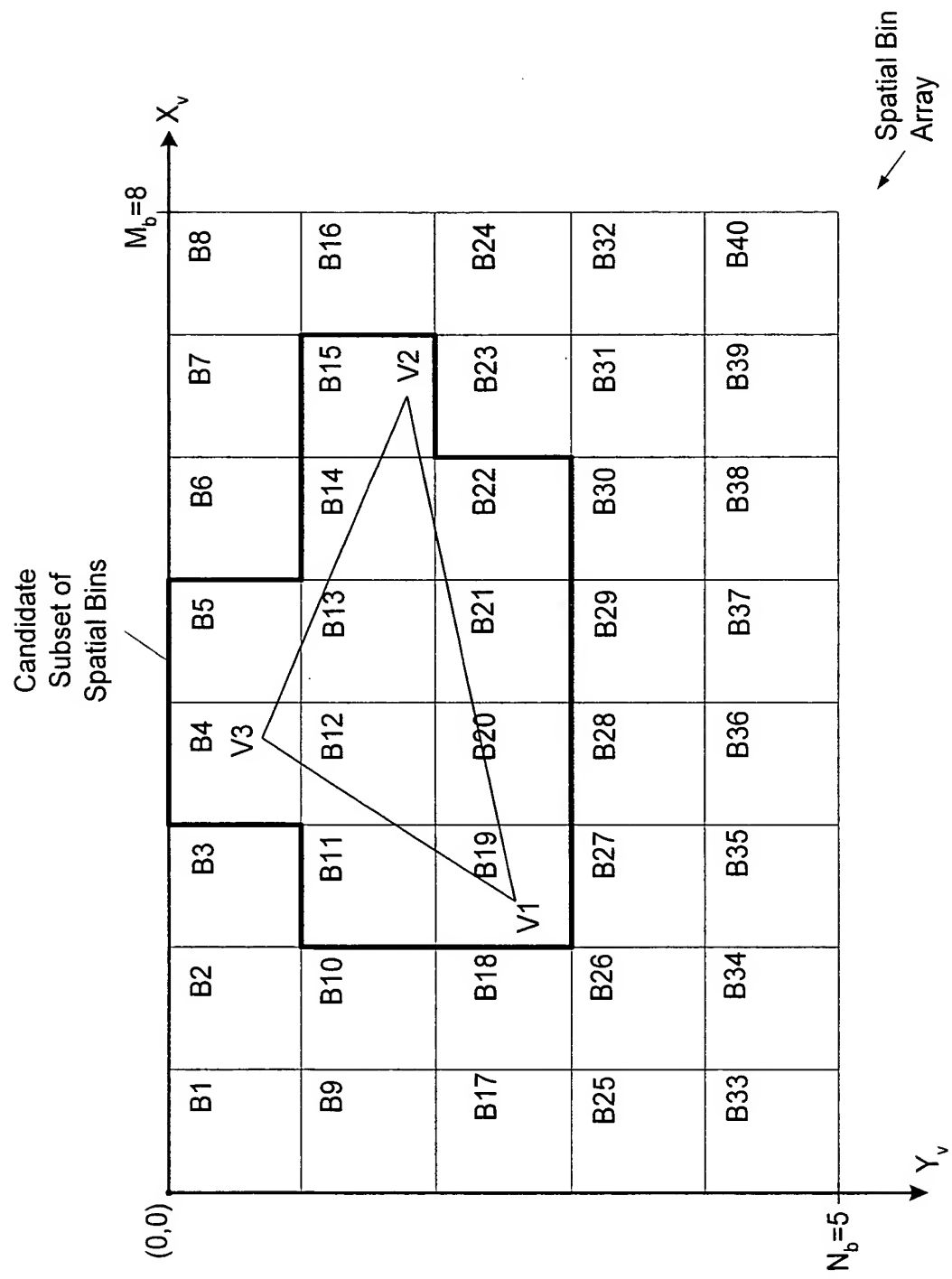


Fig. 5

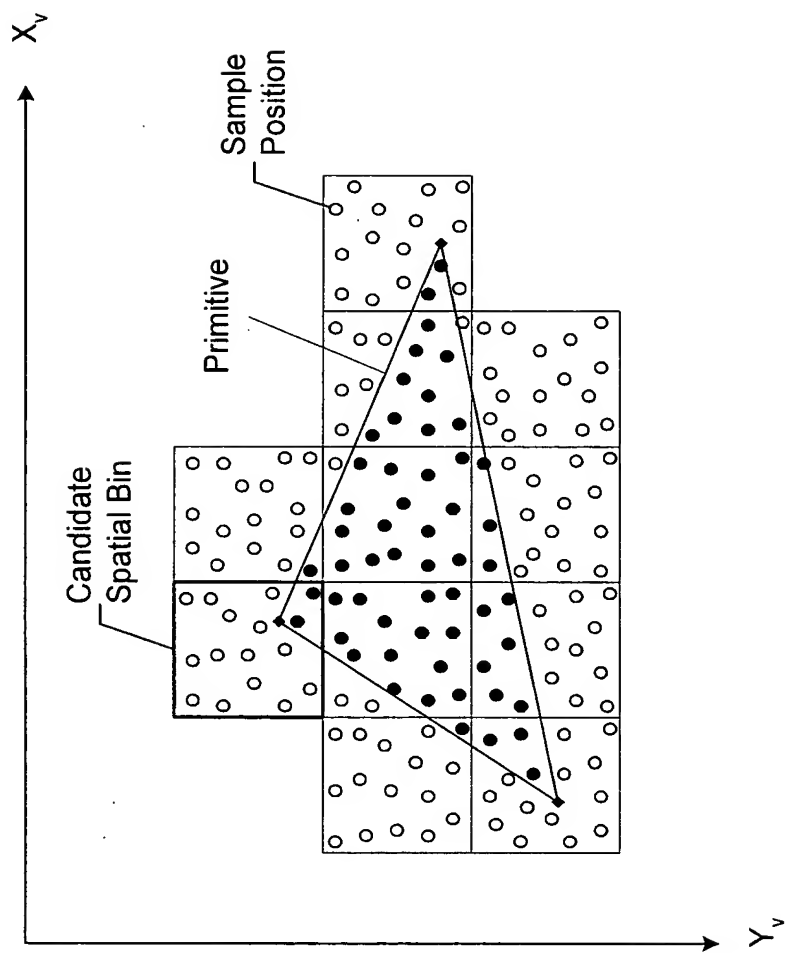


Fig. 6

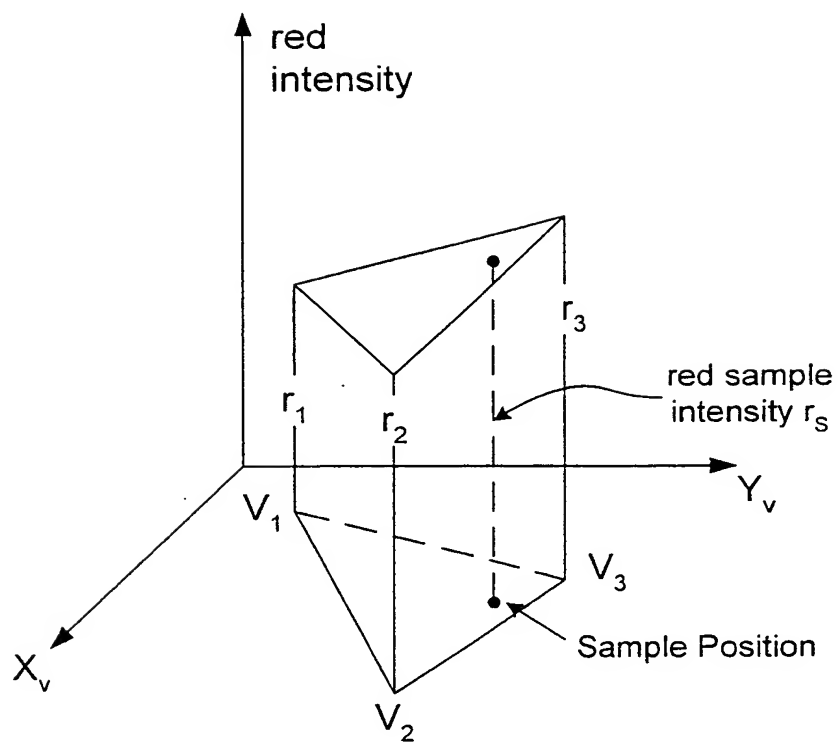


Fig. 7

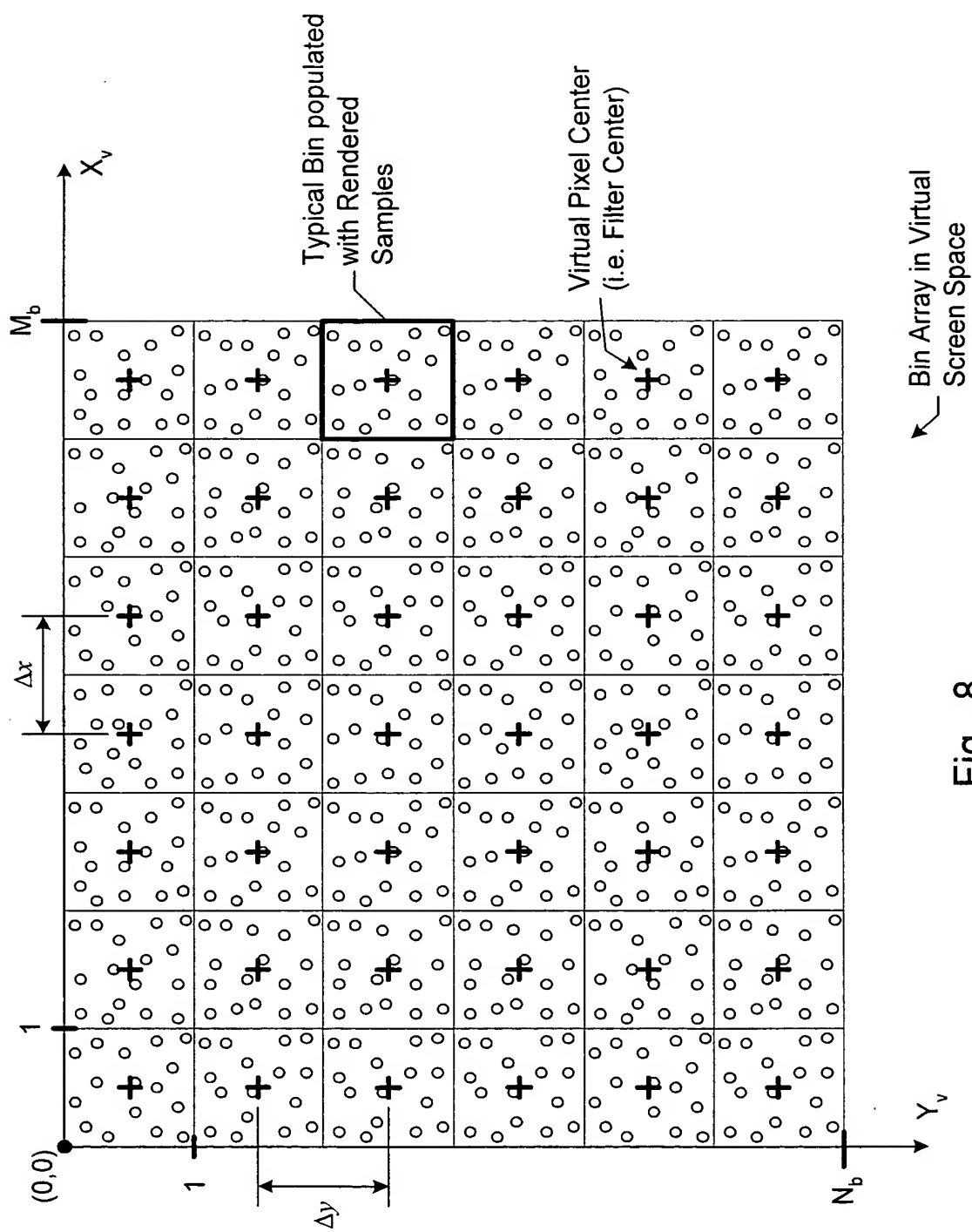


Fig. 8



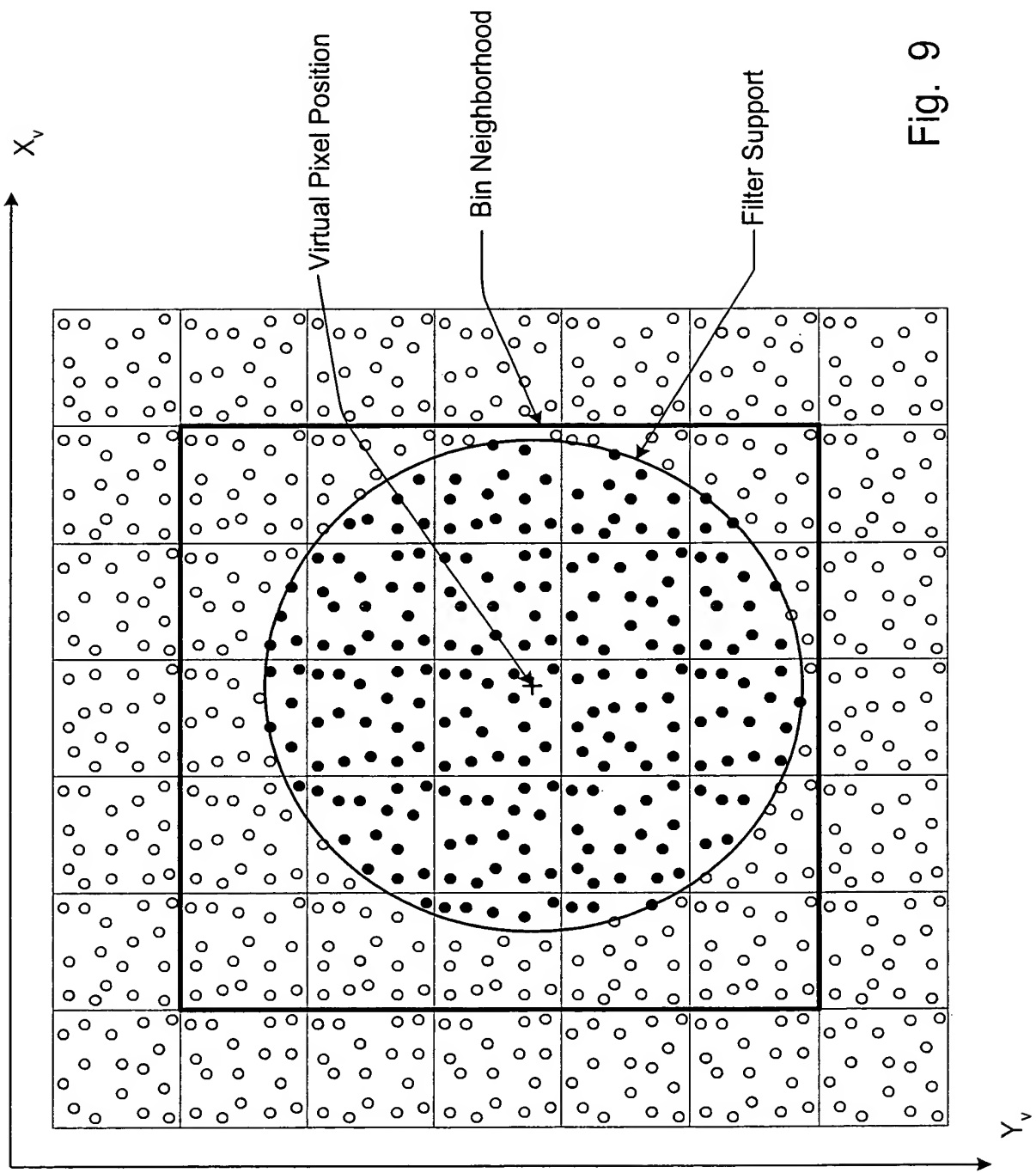


Fig. 9

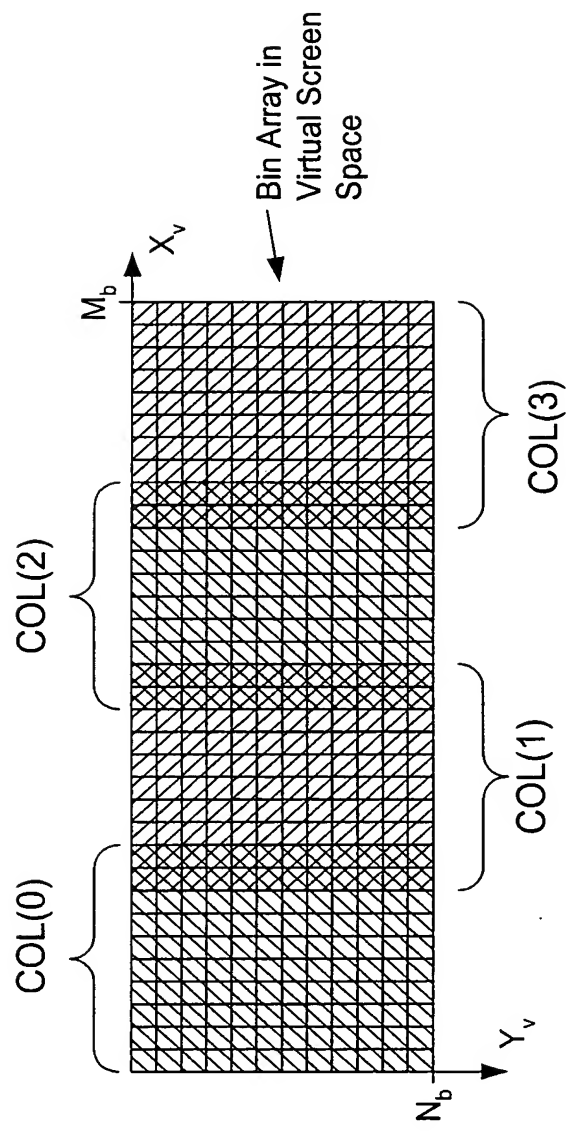


FIG. 10

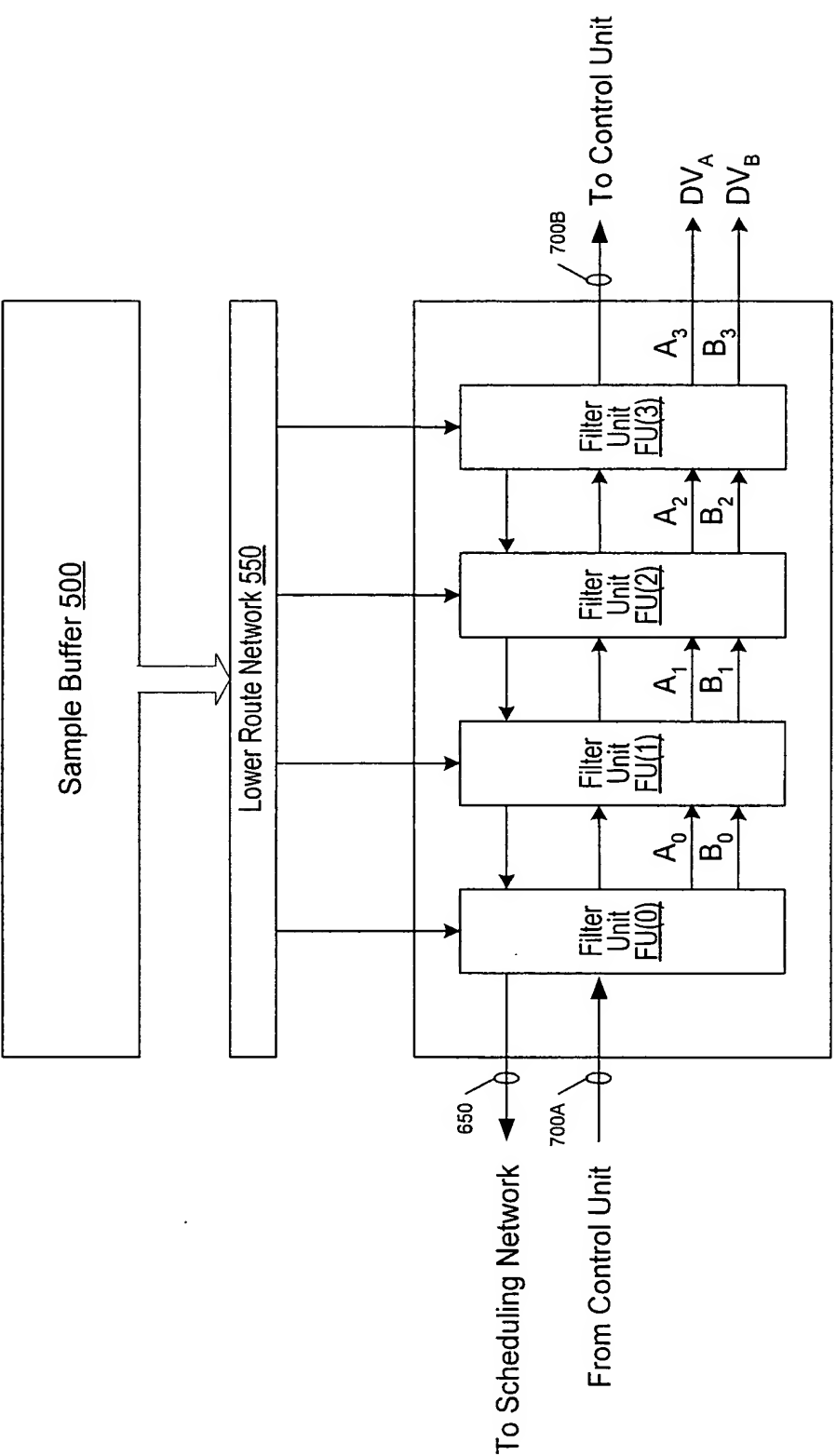


FIG. 11

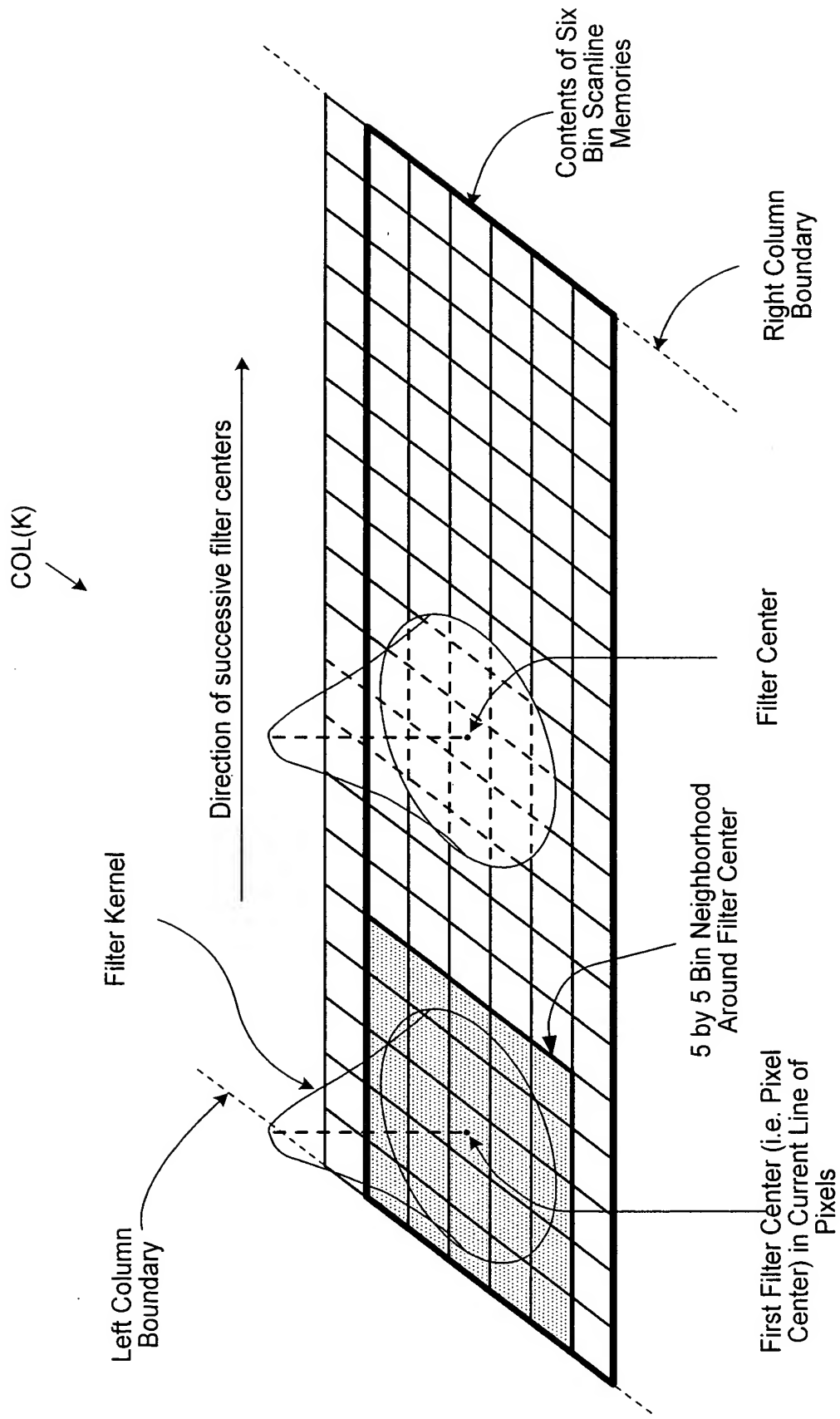


FIG. 12

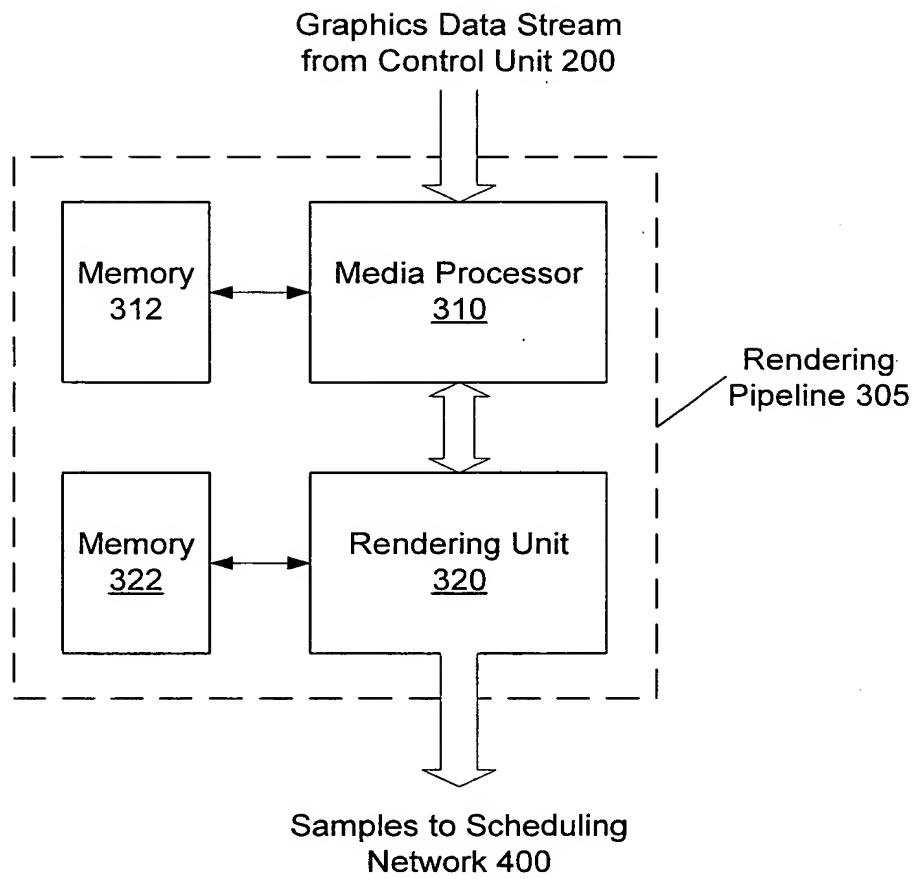


Fig. 13

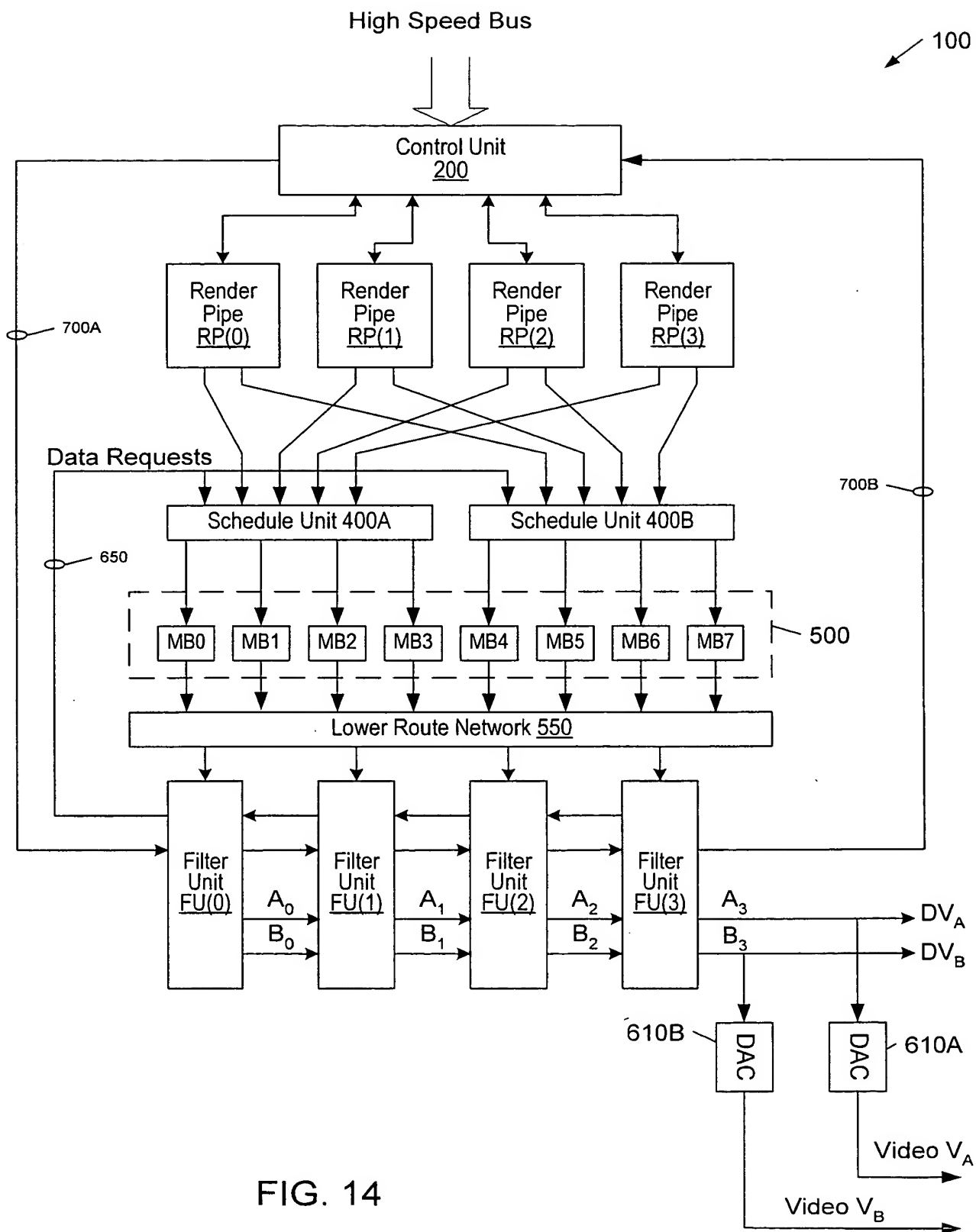


FIG. 14

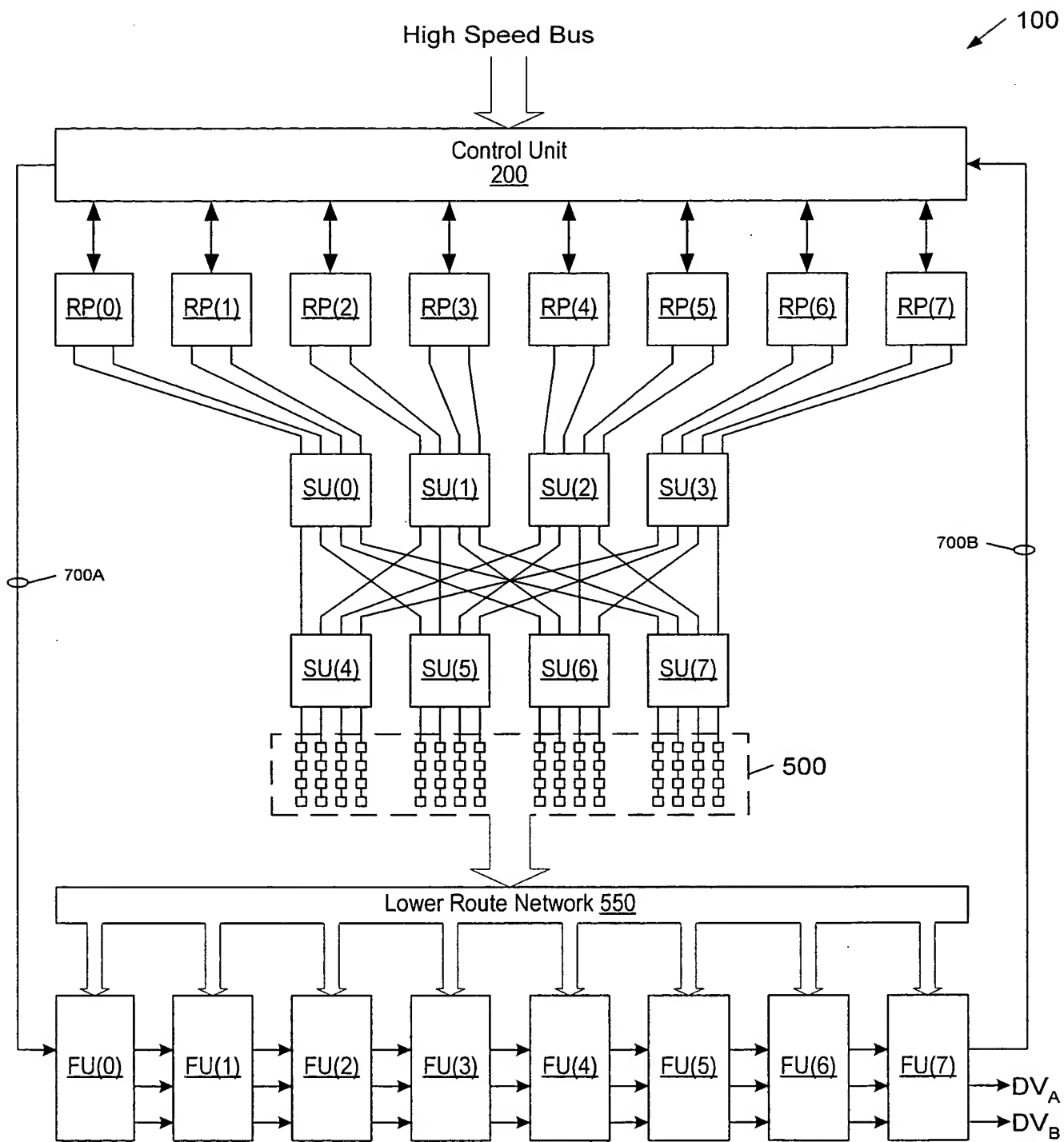


Fig. 15

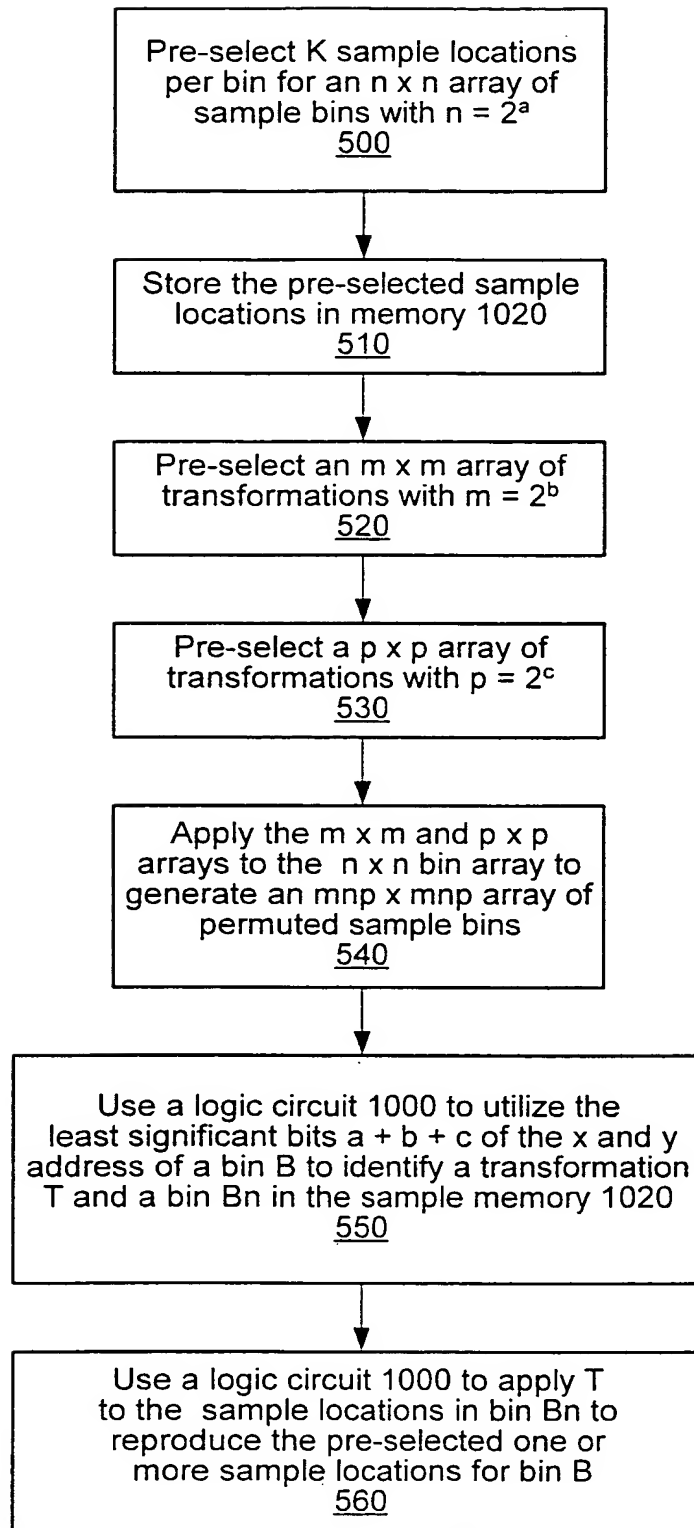
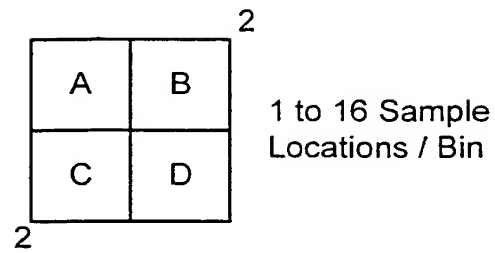


Fig. 16



Populate a 2 x 2 Sample Bin Array

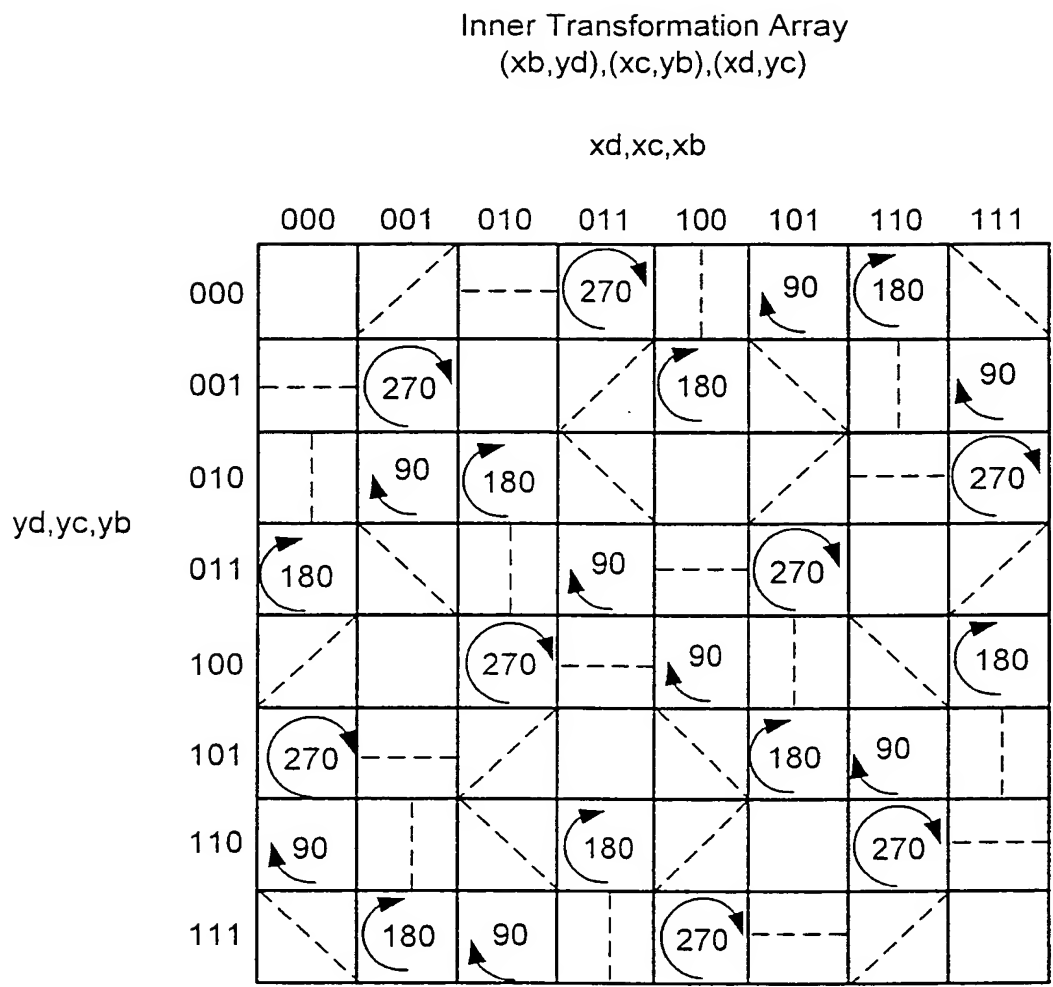


*Fig. 17a*

Select an Array of Transformations from:

iy	ix	s	Transformation
0	0	0	none
0	0	1	swapXY: mirror about y = -x -1
0	1	0	invertX: mirror about y
0	1	1	rotate 270 degrees clockwise
1	0	0	invertY: mirror about x
1	0	1	rotate 90 degrees clockwise
1	1	0	rotate 180 degrees
1	1	1	mirror about y = x

*Fig. 17b*



*Fig. 18*

Outer Transformation Array  
 $(x_4, y_5), (x_6, y_4), (x_5, y_6)$

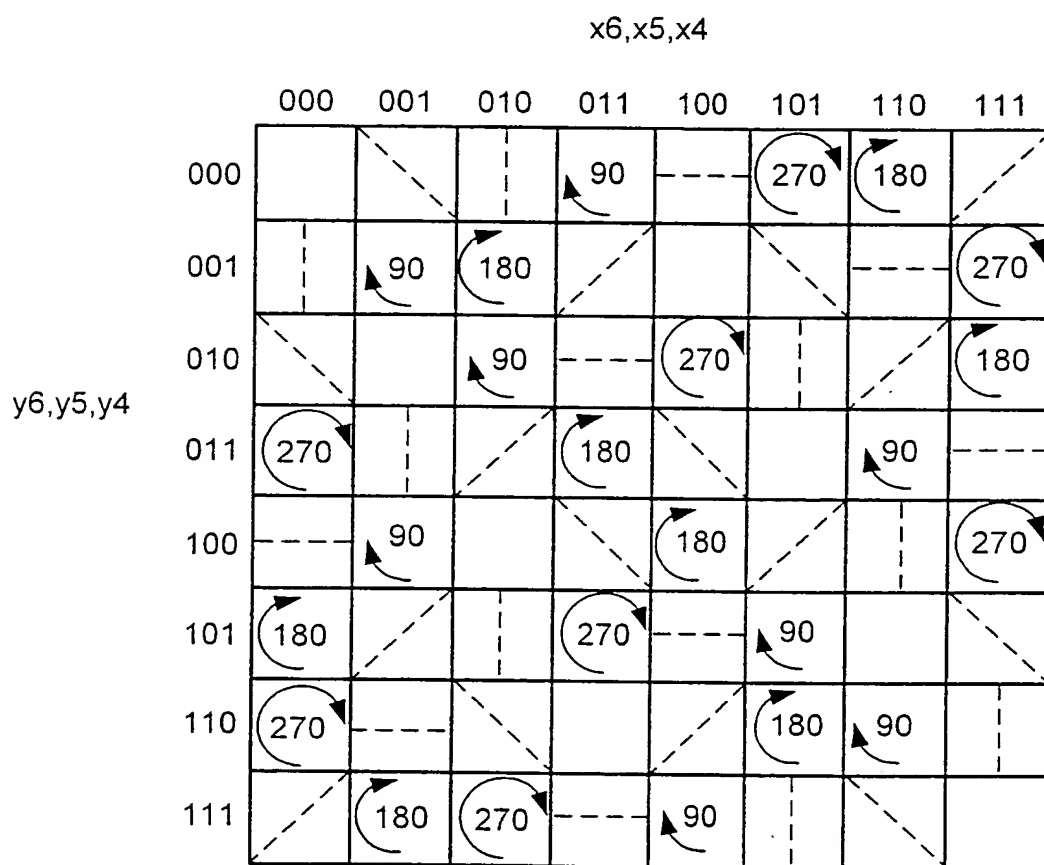


Fig. 19

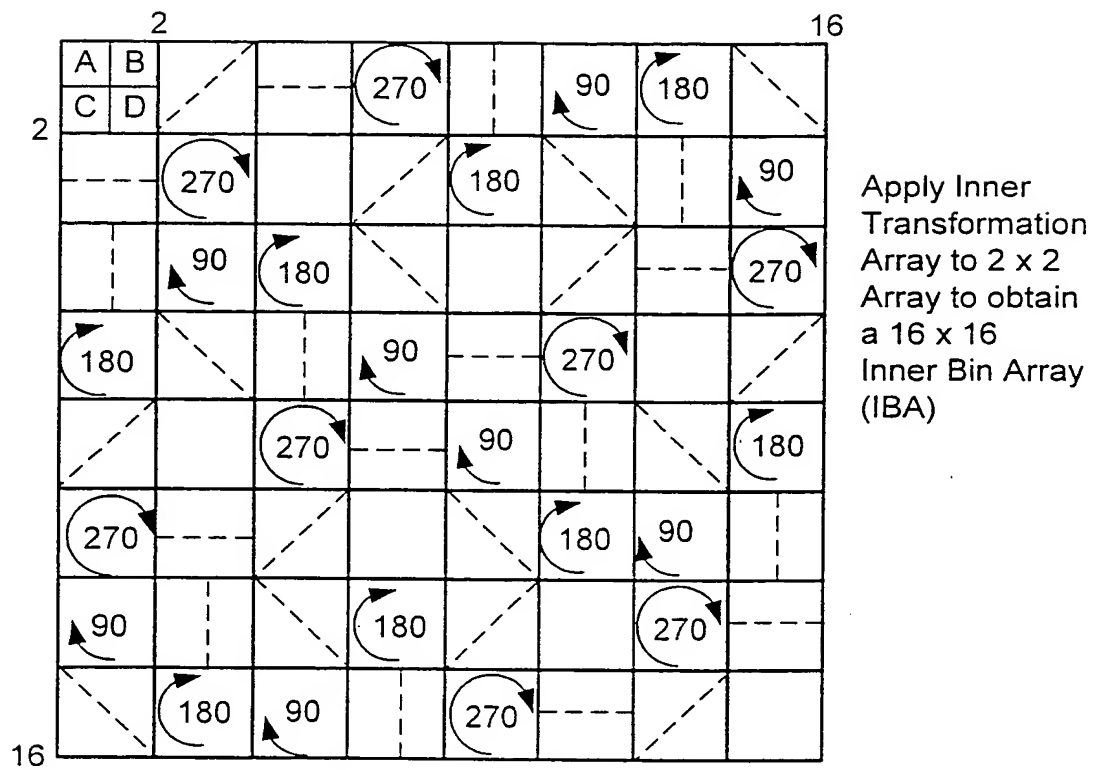


Fig. 20a

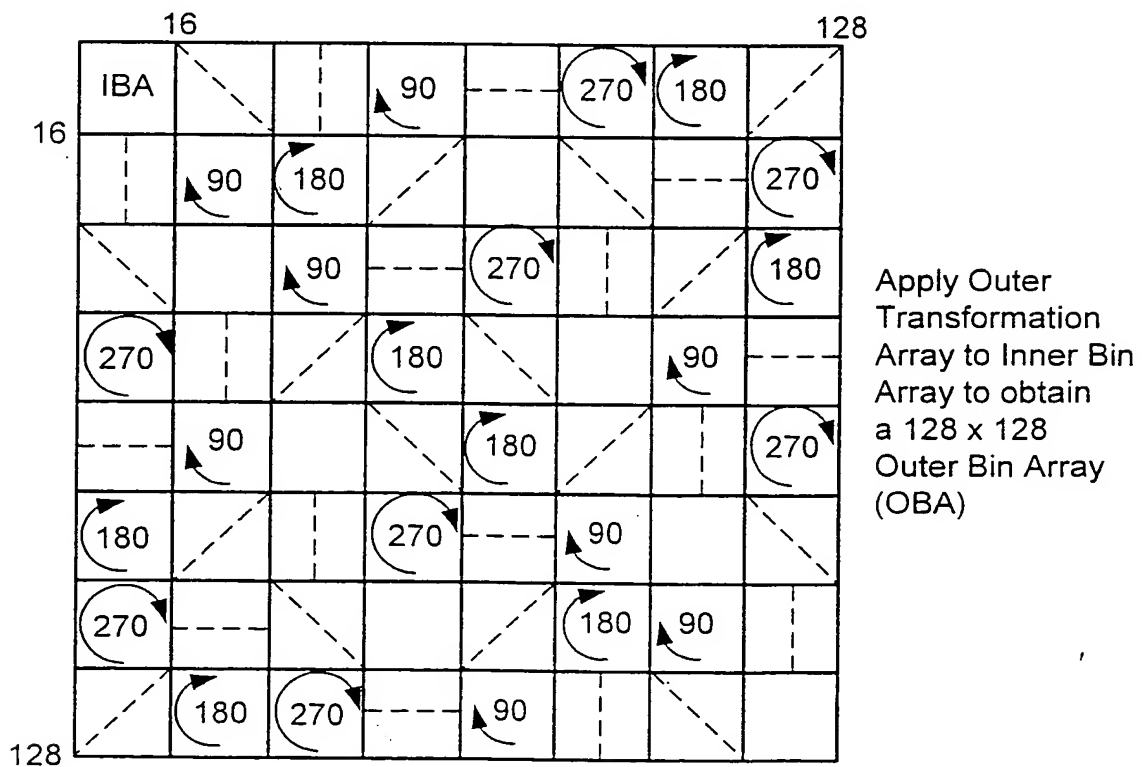
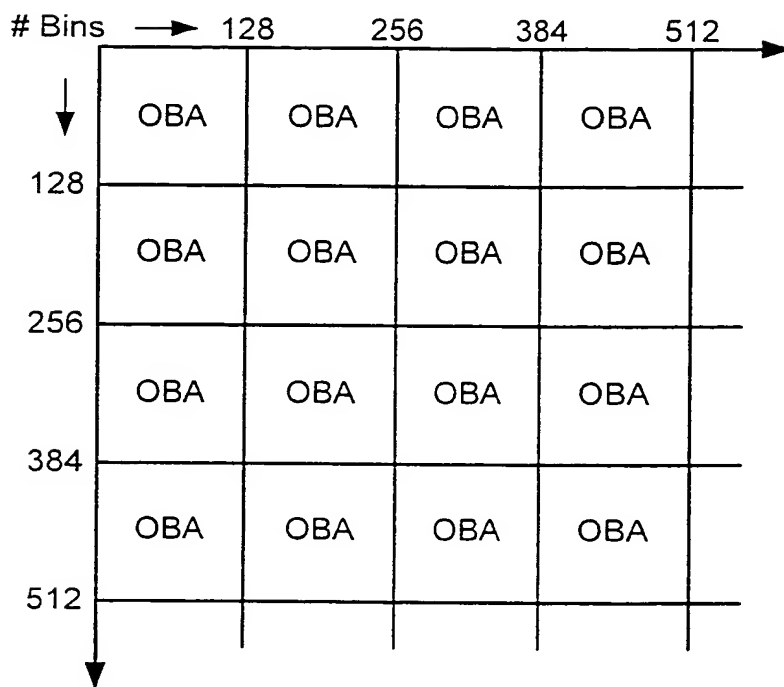


Fig. 20b

Tile Outer Bin Array To Fill Sample Space



*Fig. 20c*

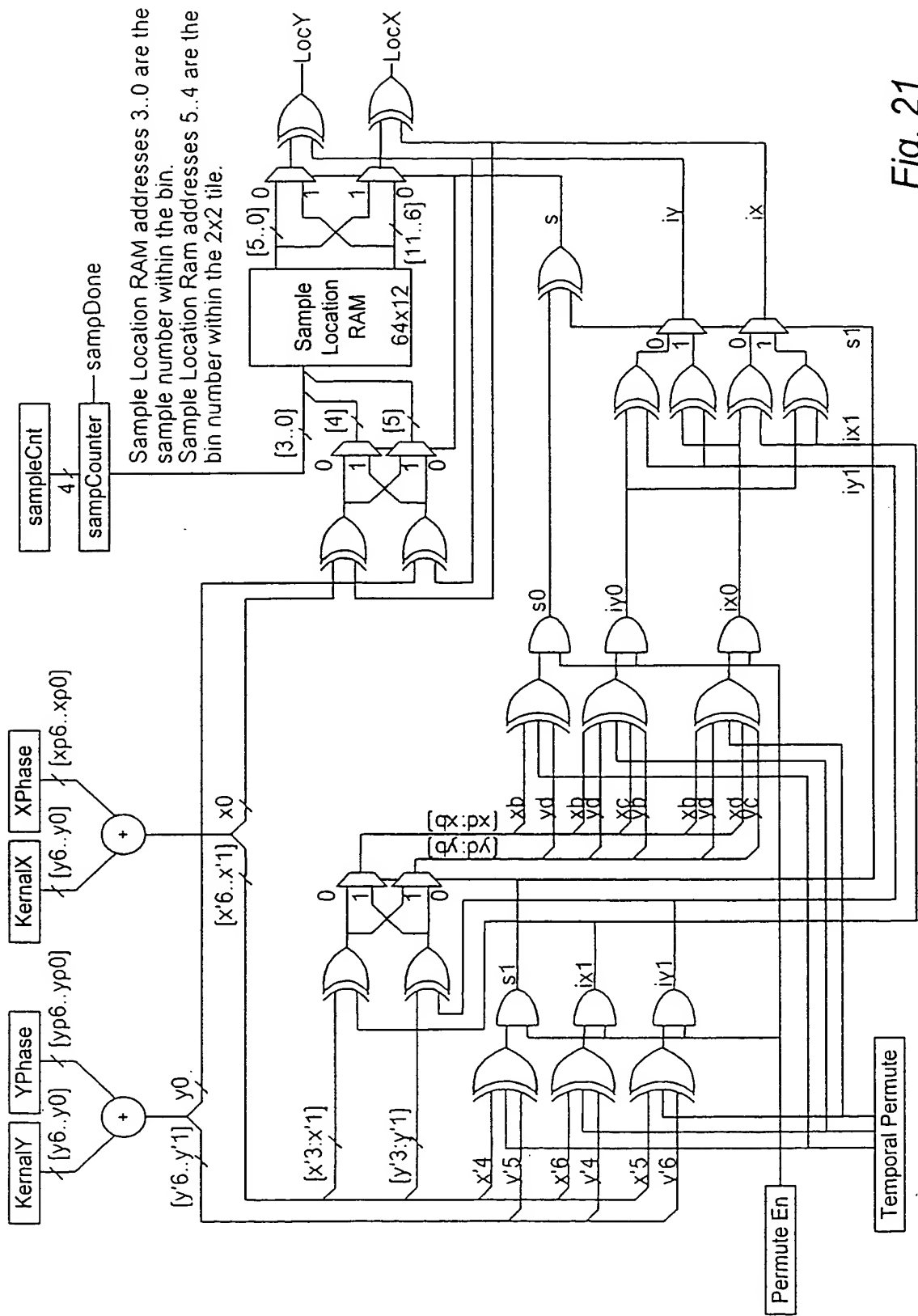


Fig. 21

Permutation Logic Circuit

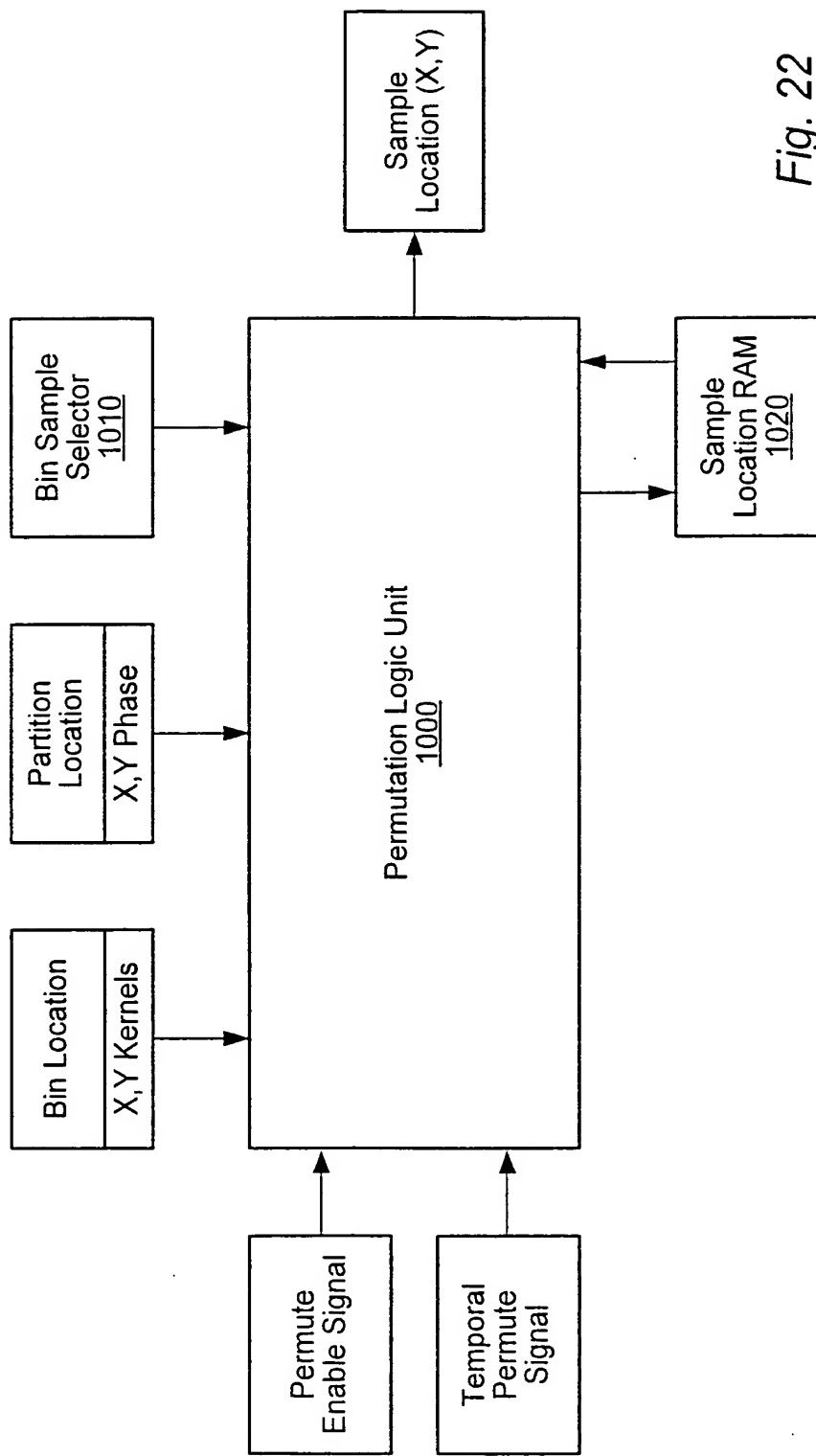
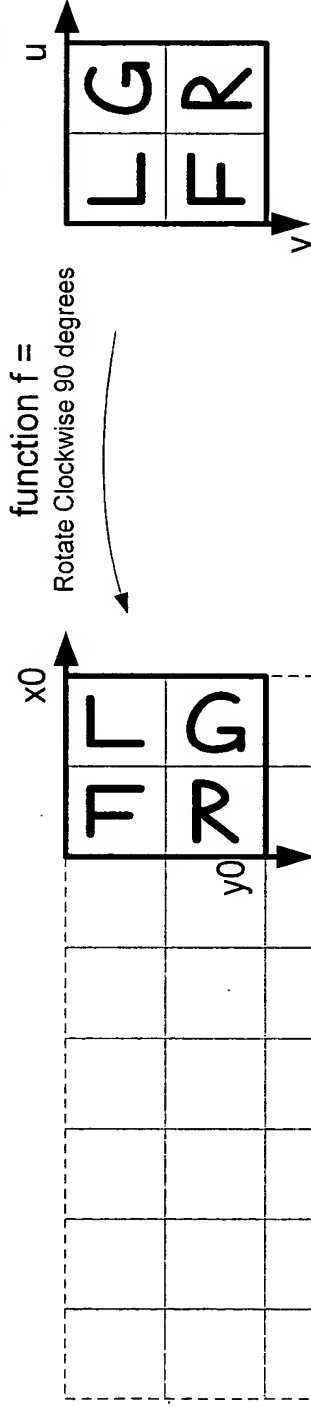


Fig. 22

Base Copy of Tile  
Stored in Sample  
Location RAM



Let  $U, V$  denote the addresses supplied to the sample location RAM. Transformations are applied to the base copy to build up an  $N \times N$  pattern. Let  $X_0$  and  $Y_0$  denote the least significant bit of the  $X$  and  $Y$  bin address respectively. For a given transformation  $f$ , the addresses  $x_0$  and  $y_0$  are determined by applying the transformation  $f$  to  $u$  and  $v$ :

$$(x_0, y_0) = f(u, v).$$

But when using the sample generation circuit, we have  $x_0$  and  $y_0$  and want to compute  $u$  and  $v$ . So we apply the inverse function:

$$(u, v) = f^{-1}(x_0, y_0)$$

**Fig. 23**



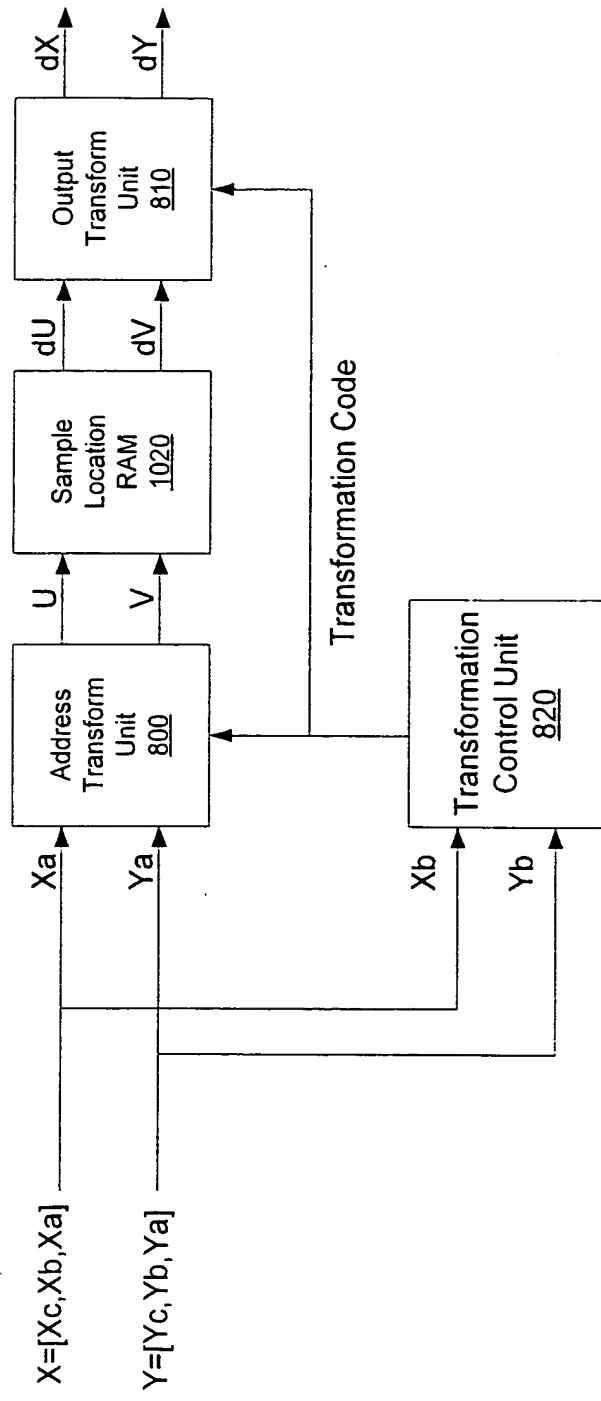


Fig. 24

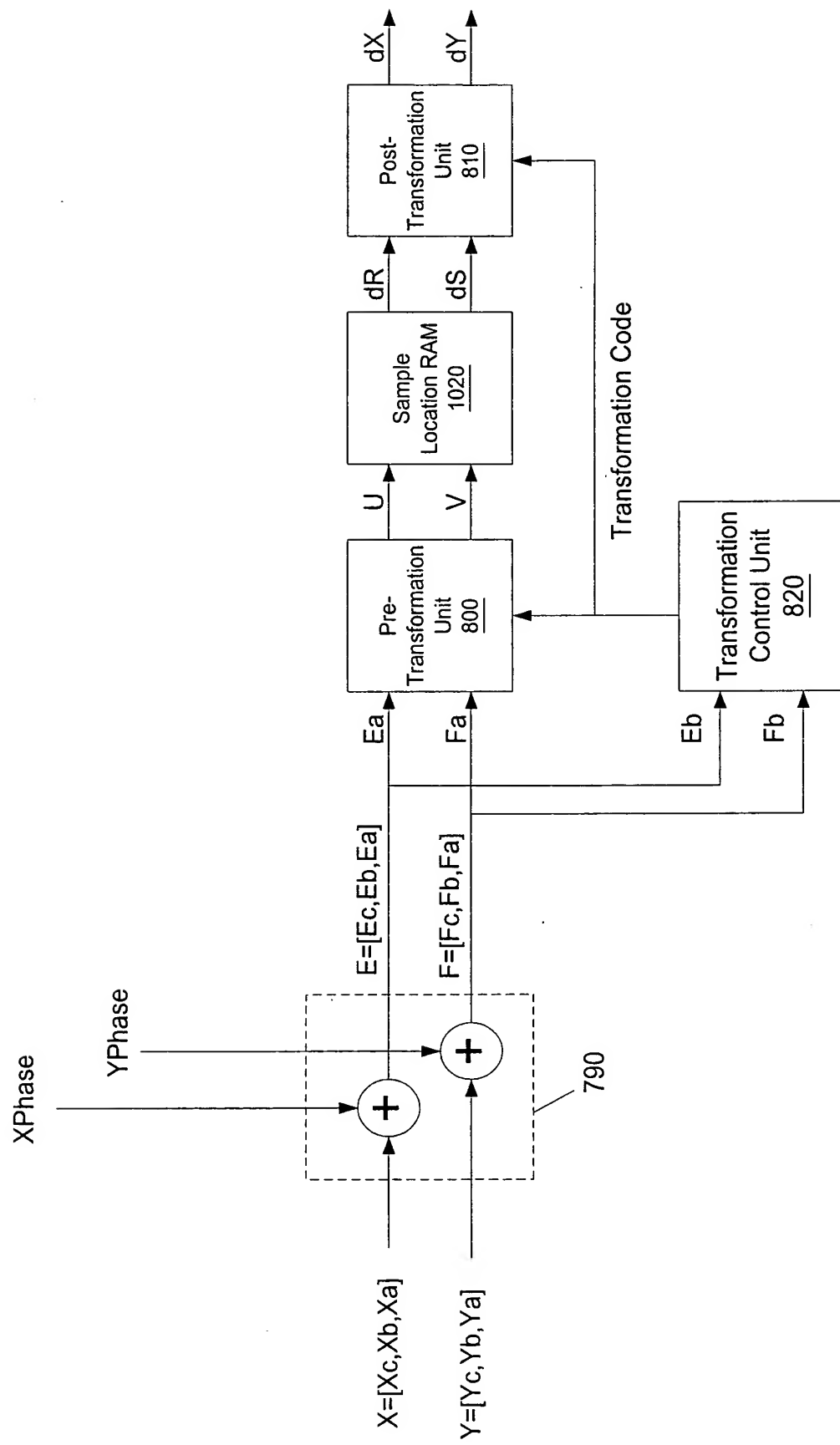
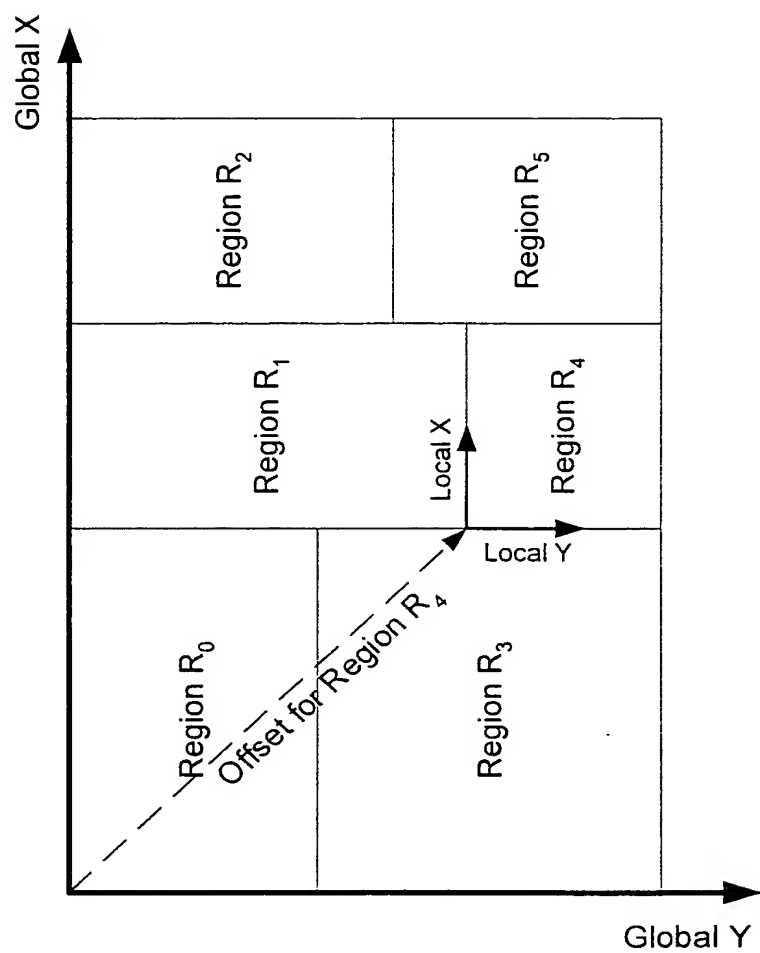


Fig. 25



*Fig. 26*

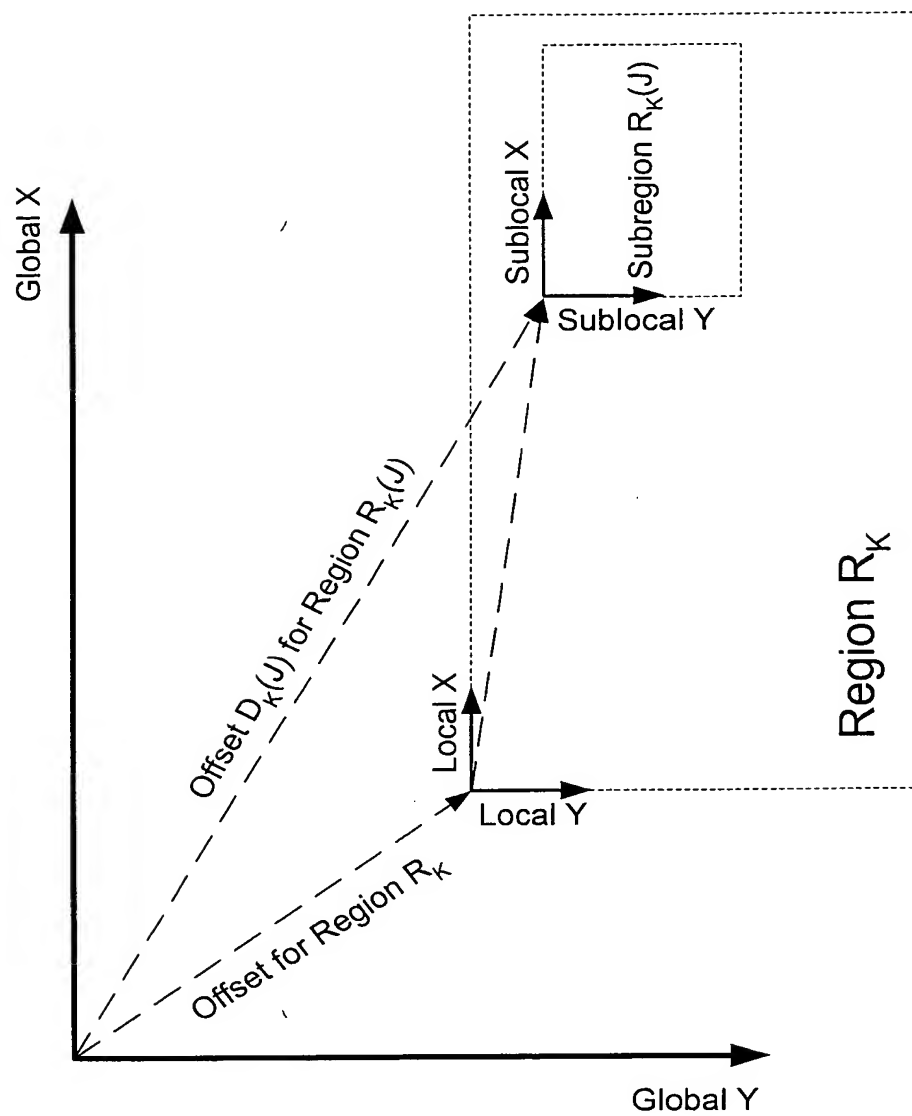


Fig. 27A

Sample Space Partitioned to 4 Filter Units

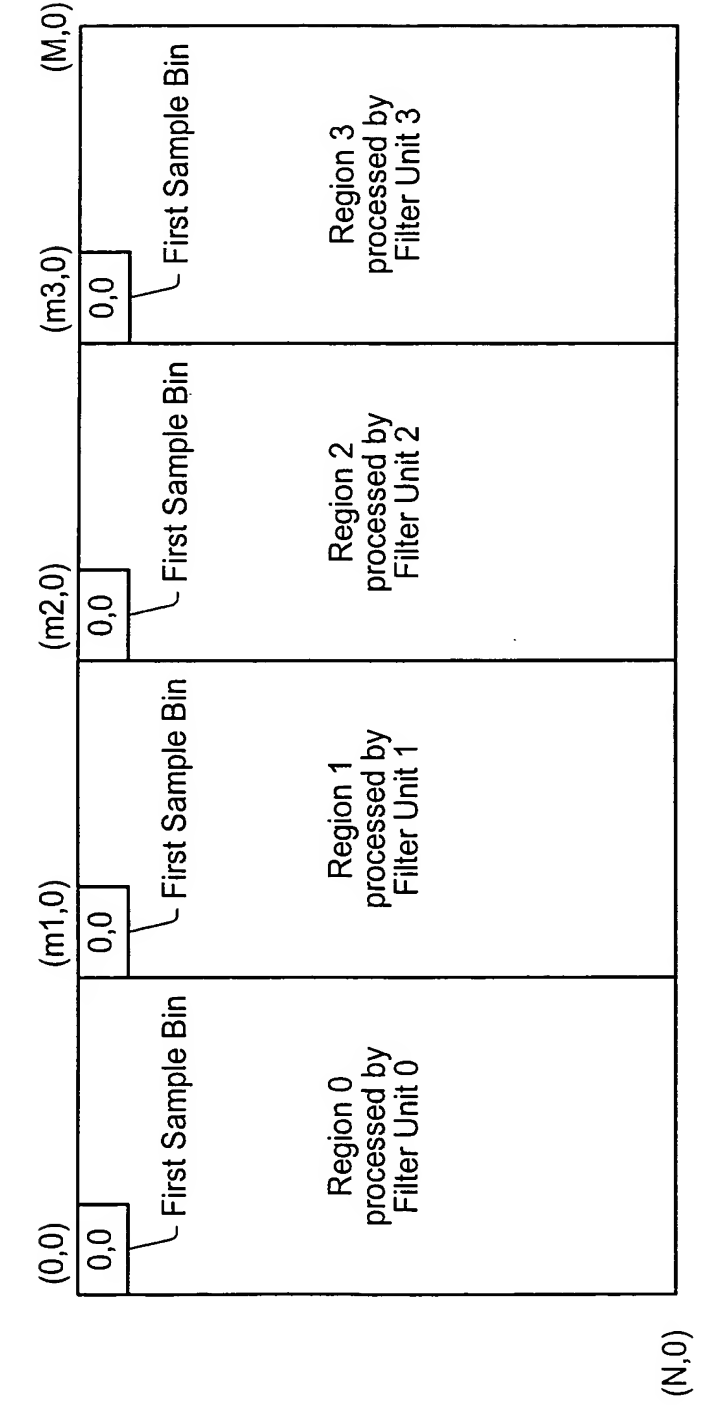


Fig. 27B

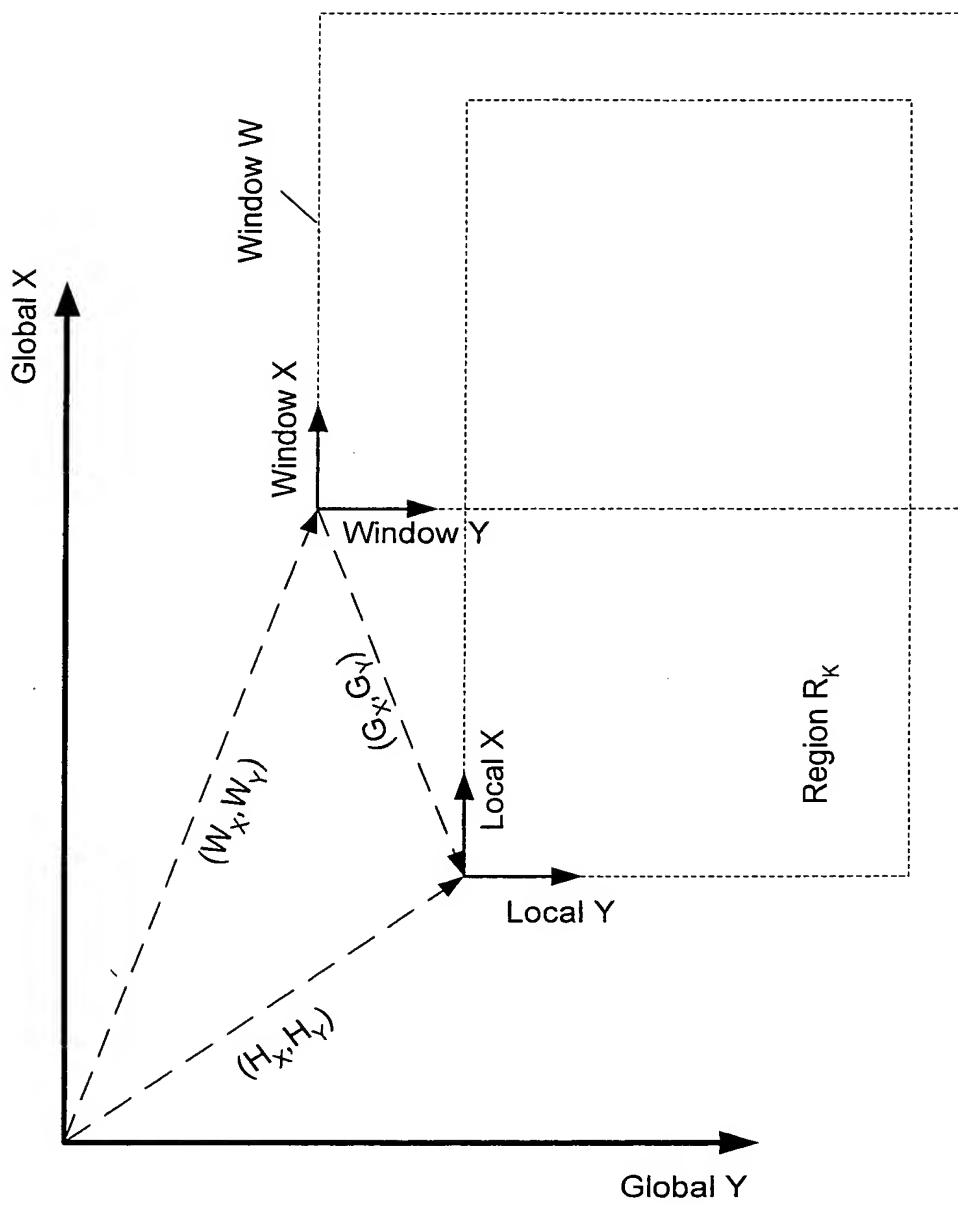


Fig. 28

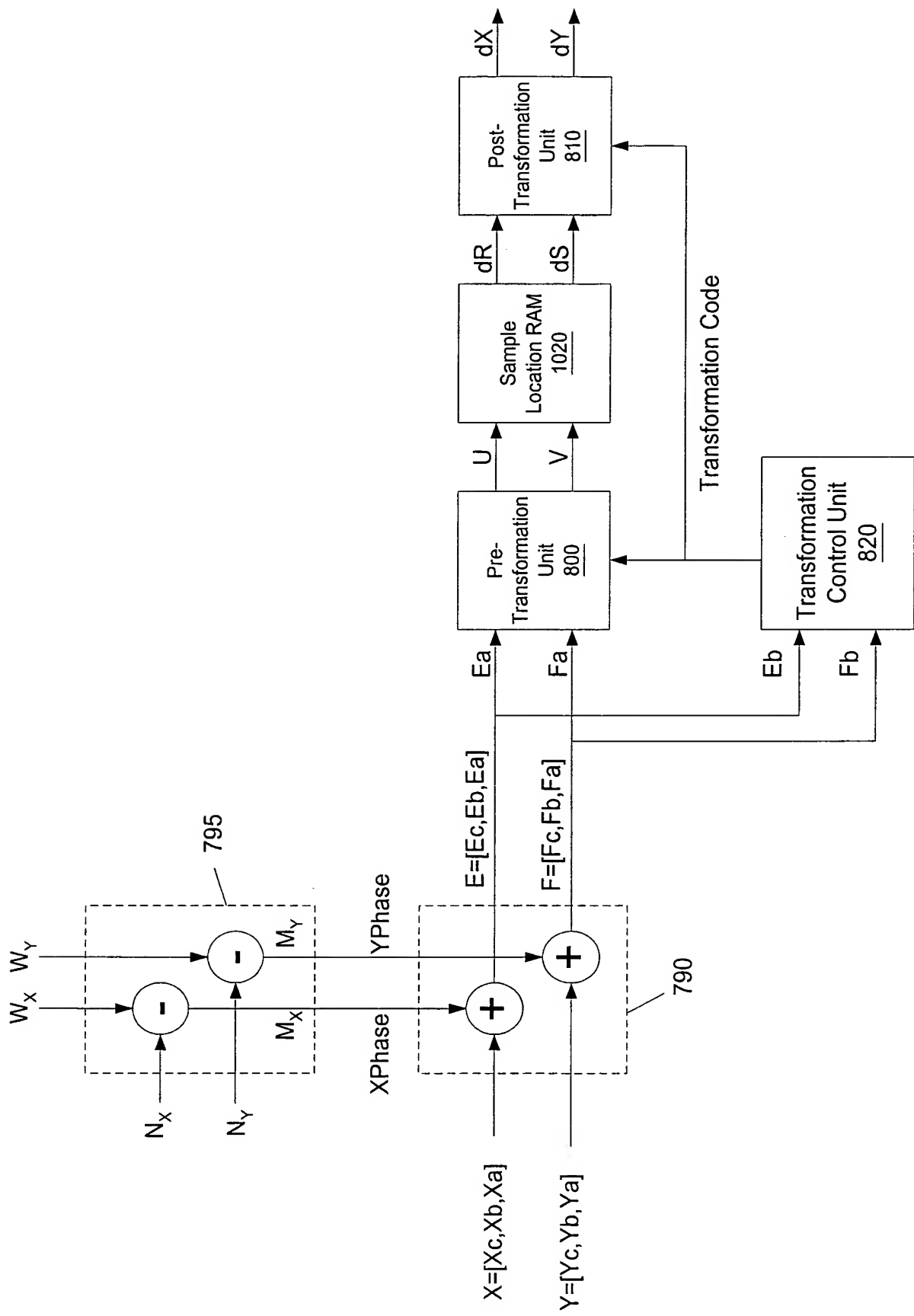


Fig. 29

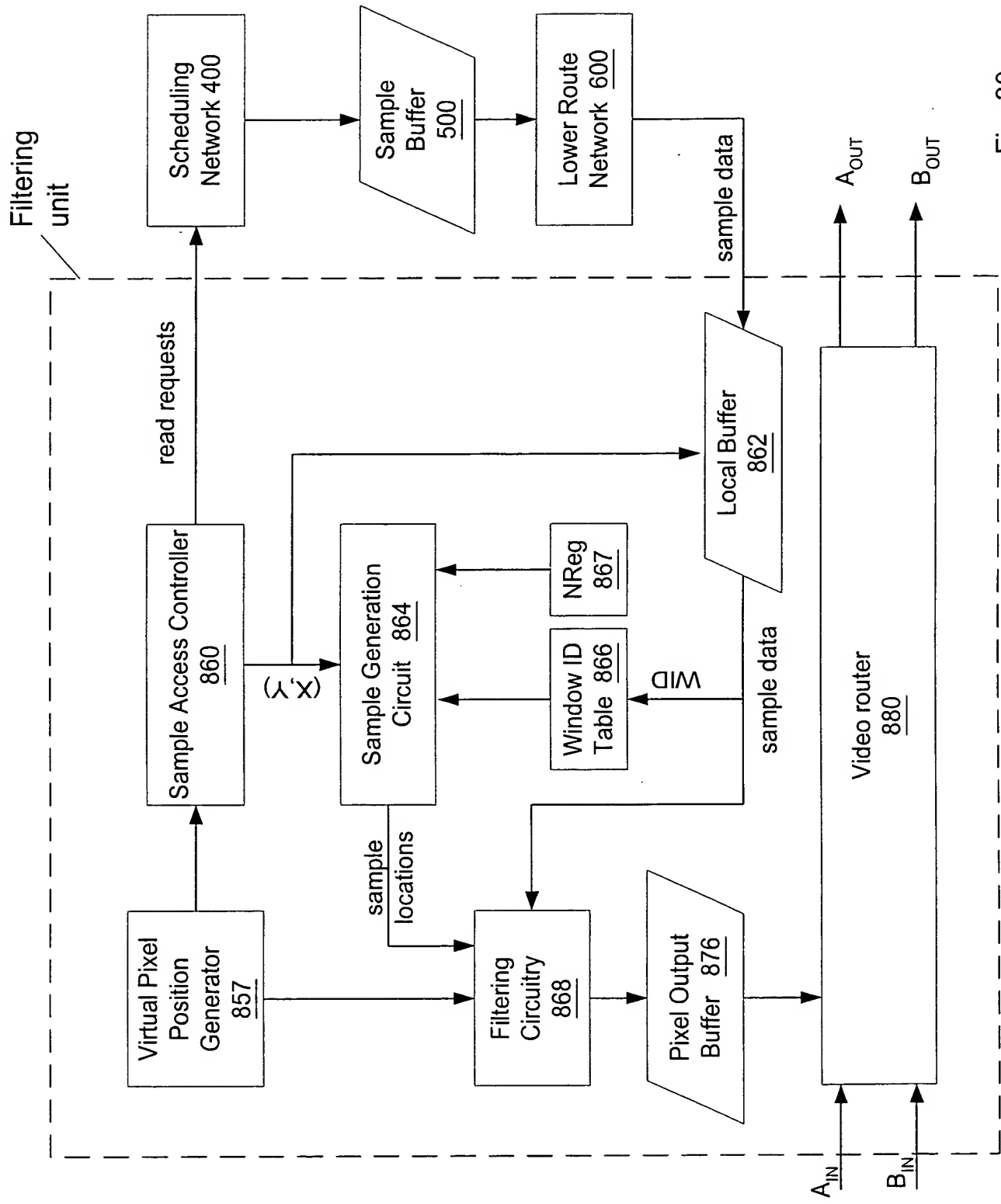


Fig. 30